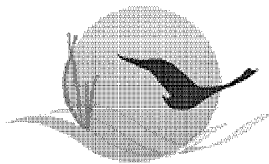


QUALITY ASSURANCE MANAGEMENT PLAN
FOR THE
CHESAPEAKE BAY PROGRAM OFFICE



U. S. ENVIRONMENTAL PROTECTION AGENCY—REGION III
CHESAPEAKE BAY PROGRAM OFFICE
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1 MANAGEMENT AND ORGANIZATION

1.1 QUALITY ASSURANCE POLICY STATEMENT

1.1.1 Introduction

The U. S. Environmental Protection Agency initiated the Chesapeake Bay Program in 1977. Congress directed EPA to establish a specialized research program capable of defining historic water quality conditions in Chesapeake Bay, characterizing current baseline conditions, and developing computation and data management tools that would be used in future management of the Bay's water quality and living resources.

The Chesapeake Bay Program's attempt to describe the Bay during the 1978-1983 research phase revealed numerous weaknesses concerning past data collection on the Bay. The characterization study indicated that there was a lack of comparable data sets for portions of the Bay and its tidal tributaries.

As a consequence of the problems identified in monitoring efforts to that point, EPA, the State of Maryland, the Commonwealths of Pennsylvania and Virginia, and the District of Columbia committed themselves to improvement and protection of the water quality and living resources of Chesapeake Bay through the Chesapeake Bay Agreements of 1983 and 1987. These agreements created the Chesapeake Executive Council to assess and oversee the implementation of the prescribed Bay improvement and protection activities, along with the Chesapeake Bay Program Office of EPA which would coordinate, advise and support the Council. In 1984, the Executive Council established the committee organization to oversee the protection of the Bay and the implementation of the program spawned by the 1983 Agreement.

The 1987 Chesapeake Bay agreement laid out specific goals, objectives, commitments in five areas: living resources, water quality, population growth and development, public information, education, and participation, and governance. Over the following decade and a half, the Executive Council signed a series of directives, strategies, and commitments establishing restoration goals and expanding areas of focus of Bay restoration and protection to include among others baywide fisheries management, riparian forest buffers, land growth and stewardship, exotic species, community watersheds, and innovative technologies.

In the year 2000, a third Chesapeake Bay Agreement was written by the partners of the Chesapeake Bay Program. The *Chesapeake 2000 Agreement* builds upon previous Bay Program's accomplishments and commitments. The primary goal

of the new agreement is to improve water quality sufficiently in order to sustain the living resources of the Chesapeake Bay and its tidal tributaries and to maintain that water quality into the future. Other commitments relate to sediment reductions, estuarine living resources, improved and increased habitat, better management of resource lands, and fully engaged local governments and citizens.

1.1.2 Quality System Goals and Objectives

The Chesapeake Bay Program Office has developed and integrated quality assurance practices into all phases of the environmental data collection activities under its funding purview. These quality assurance practices are focused on ensuring that all data generated through Chesapeake Bay Program Office funding are scientifically valid, defensible, of known quality and designed to meet data user requirements.

This Quality Management Plan satisfies Agency policy for environmental data collection set forth in EPA Order 5360.1, which requires that EPA programs establish and implement a Quality Management System. It defines and describes the quality assurance policies and responsibilities prescribed by the Chesapeake Bay Program to ensure that the results of technical work are of the type and quality needed for their intended use. This document describes the Chesapeake Bay Program Office Quality System objectives, organization, policies, and work processes designed to produce data of known quality that guide Project Officers in the uniform implementation of requirements for all grants, contracts, cooperative and interagency agreements involving environmental data collection.

1.1.3 Policy

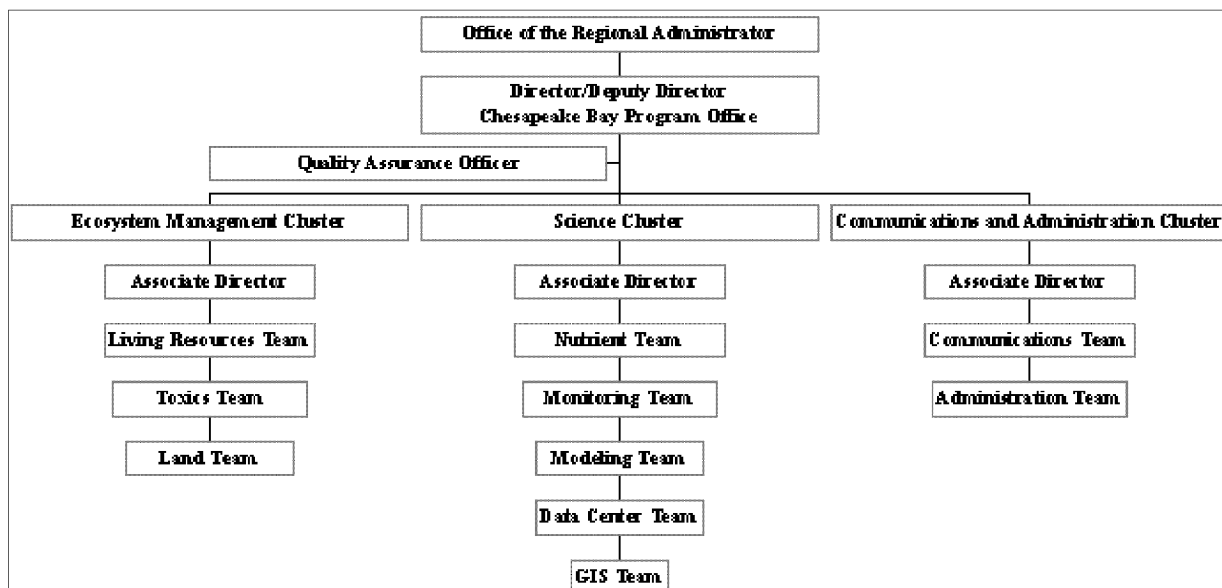
It is the policy of the Chesapeake Bay Program Office that the Quality Assurance Program will be appropriate to assure that all environmental data generated, and where possible, processed or used by the Chesapeake Bay Program, will be scientifically valid; of acceptable completeness, representativeness, and comparability; and of a known and documented quality. It is also the policy of the Chesapeake Bay Program Office that all reported data will include, where possible, documentation of precision and accuracy. The quality of the data generated under the auspices of the Program shall meet or exceed all State, Regional and National Program Office requirements. This policy shall be implemented by ensuring that for all environmental Chesapeake Bay Program funded data efforts, adequate quality assurance procedures will be employed throughout the entire environmental data collection process from study design

through data access. The Chesapeake Bay Program will allocate sufficient funds to ensure that these policies are carried out.

1.2 ORGANIZATIONAL CHART

The Chesapeake Bay Program Office is organizationally located under the office of the Regional Administrator within EPA Region 3 (Figure 1).

Figure 1. Chesapeake Bay Program Office Organization Chart

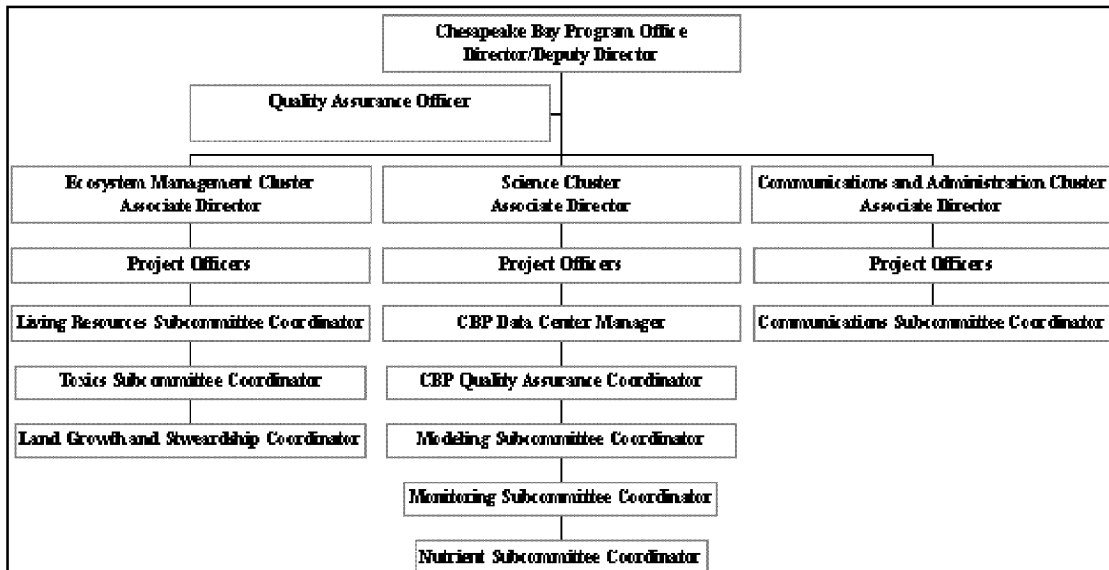


1.3 RESPONSIBILITIES

1.3.1 Organization, Delegations and Responsibilities

The **Director of the Chesapeake Bay Program Office** has overall program management responsibilities for all restoration and protection activities including generation of data of documented quality and management responsibilities for the development, implementation, and continued operation of the Chesapeake Bay Program Office Quality Assurance Program. Specific quality assurance management and implementation responsibilities are assigned to the Associate Director for Science, the Project Officers, the Chesapeake Bay Program Subcommittee Coordinators, the Chesapeake Bay Program Quality Assurance Coordinator and the Chesapeake Bay Program Data Center Manager.

Figure 2. Chesapeake Bay Program Office Organization and Line Authority in Terms of Managers, Project Officers and Subcommittee Coordinators



The authority and responsibility for managing the quality assurance activities within the Chesapeake Bay Program Office has been delegated to the **Associate Director for Science** as the **Chesapeake Bay Program Office Quality Assurance Officer**. The Chesapeake Bay Program Office Quality Assurance Officer has the overall responsibility for the development, implementation and continued oversight of the Chesapeake Bay Program Office Quality Assurance Program. The Chesapeake Bay Program Quality Assurance Officer reports directly to the Director of the Chesapeake Bay Program Office and serves as the quality assurance liaison with the Regional Office.

The following list enumerates the responsibilities of the Chesapeake Bay Program Office Quality Assurance Officer:

- Serves as the official Chesapeake Bay Program Office contact for all quality assurance and quality control matters of the Chesapeake Bay Program Office;
- Coordinates Chesapeake Bay Program Office quality assurance matters with the Regional Quality Assurance Manager to insure that all methods, quality assurance policies are in accordance with current EPA National and Regional guidelines;

- Prepares the Chesapeake Bay Program Office Quality Management Plan;
- Annually reviews the Quality Management Plan and revises it if changes are necessary;
- Oversees all quality assurance and quality control activities within the Chesapeake Bay Program Office.
- Identifies and delegates responsibility for responding to specific quality assurance and quality control needs, and ensures timely answers requests for guidance or assistance.
- Ensures all quality assurance program plans and quality assurance project plans are technically reviewed and approved prior to awarding grants, contract, cooperative agreements, and interagency agreements involving collection and/or analysis of environmental data;
- Ensures that problems and deficiencies identified in technical audits and data analysis are resolved;
- Includes statements in the Chesapeake Bay Program grants, cooperative and interagency agreement guidance that specify quality assurance requirements; and
- Establishes criteria for the acceptability of quality documentation in Chesapeake Bay Program quality assurance reports.

The **Project Officers** have the overall responsibility for ensuring that the recipients of federal funds implement the quality assurance activities required by EPA as stated in Chesapeake Bay Program Office grants, cooperative and interagency agreements guidance and documented with the individual assistance agreement. The Project Officers ensure all statements of work include specific guidance and criteria about the quality of environmental measurements expected. The Project Officers must obtain agreement from the Chesapeake Bay Program Office Quality Assurance Officer on all matters affecting quality assurance, however, are ultimately responsible for resolving problems and deficiencies identified in technical reviews, audits and data analysis.

The **Chesapeake Bay Program Subcommittee Coordinators** are responsible for ensuring that requirements of the Quality Assurance Program are identified during Subcommittee meetings and in activities sponsored by the Subcommittees. The Subcommittee Coordinators ensure that quality assurance is an integral part

of environmental data collection activities is sponsored by the Subcommittees. Coordination of quality assurance activities among numerous partner state and federal agencies, academic institutions, and organizations is accomplished through the Subcommittees.

The **Chesapeake Bay Program Quality Assurance Coordinator** is responsible for coordinating quality assurance efforts among and between the Chesapeake Bay Program partners as they relate to environmental data collection efforts supporting Bay restoration and protection programs. The Chesapeake Bay Program Quality Assurance Coordinator performs quality assurance system audits--systematic on-site qualitative reviews of facilities, equipment, training, procedures, record-keeping, data validation, data management, and reporting aspects of the total quality assurance system--to insure that the approved quality assurance project plans, approved quality management plans, as well as approved sample handling and analytical procedures are in use. The Coordinator summarizes, substantiates and presents the audit findings to the Chesapeake Bay Program Office Quality Assurance Officer.

The Quality Assurance Coordinator performs a technical review of Quality Assurance documents and makes recommendations about their adequacy to the Project and Quality Assurance Officers. S/he participates in the technical assessment of the coordinated split sample results and prepares or reviews summary reports.

The different roles of the Chesapeake Bay Program Office Quality Assurance Officer and the Chesapeake Bay Program Quality Assurance Coordinator are described as a cross walk in Table 1 below.

The **Chesapeake Bay Program Data Center Manager** has the program management responsibility for ensuring all the environmental data generated through the monitoring programs and projects funded directly by the EPA Chesapeake Bay Program Office or as matching funds have been subjected to an audit of data quality and will be documented as to known quality prior to being made accessible to Chesapeake Bay Program partners and the public through the Chesapeake Information Management System.

Table 1. Cross Walk of the Quality Assurance Responsibilities Held by Federal Employees within the EPA Chesapeake Bay Program Office

EPA Chesapeake Bay Program Office Quality Assurance Officer¹	Chesapeake Bay Program Quality Assurance Coordinator²	EPA/Federal Chesapeake Bay Program Project Officers³
Drafts, approves and signs all quality assurance policies and the EPA Chesapeake Bay Program Office's Quality management plan.		Provide technical input on draft policy and management oriented quality assurance documents.
Reviews technical comments and recommendations; coordinates corrections of deficient QAPP's with the project officers; provides for final EPA approval of and signs all quality assurance project plans.	Independently reviews, prepares technical comments, and makes recommendations for addressing the adequacy of draft quality assurance project plans.	Review draft quality assurance project plans; formally transmit technical comments to assistance agreement recipients; ensure recipients respond to all technical comments; sign approved quality assurance project plans.
Approves all audit plans and/or SOPs prior to initiation of technical assessments; reviews technical assessment findings; determines necessary response actions; assigns responsibility for followup to response actions.	Conducts on-site technical assessment of field, laboratory and data handling operations; prepares technical comments and recommends necessary response actions in accordance to established technical assessment SOPs.	Formally transmit technical on-site field, laboratory, data/information management audit comments to assistance agreement recipients; ensure assistance agreement recipients respond to all technical comments received.
Approves all split sampling plans and/or SOPs prior to initiation of split sample assessments; reviews split sample assessment findings; determines necessary response actions; assigns responsibility for followup to response actions.	Coordinates the multi-laboratory and field sample agency basinwide coordinated split sample program; responsible for analysis and interpretation of the results; prepares recommendations resulting from split sample program.	Formally transmit any technical issues and/or requests for response to results from the basinwide coordinated split sample program to assistance agreement recipients; ensure assistance agreement recipients respond to all technical comments received.
Approves all split sampling plans and/or SOPs prior to initiation of split sample assessments; reviews recommendations from blind reference audits; determines necessary response actions; assigns responsibility for followup to response actions.	Coordinates the blind reference material audit program; responsible for analysis and interpretation of the results; prepares recommendations resulting from blind reference material program.	Formally transmit any technical issues and/or requests for response to results from the blind reference audit program to assistance agreement recipients; ensure assistance agreement recipients respond to all technical comments received.

EPA Chesapeake Bay Program Office Quality Assurance Officer¹	Chesapeake Bay Program Quality Assurance Coordinator²	EPA/Federal Chesapeake Bay Program Project Officers³
Reviews recommendations from the Chesapeake Bay Program's Analytical Methods and Quality Assurance Workgroup; determines necessary response actions; assigns responsibility for followup to response actions.	Works through the Chesapeake Bay Program's Analytical Methods and Quality Assurance Workgroup to identify data quality problems associated with field sampling techniques and analytical methods and develops recommendations.	Formally transmit any technical issues and/or requests for response to issues raised by the Chesapeake Bay Program's Analytical Methods and Quality Assurance Workgroup to assistance agreement recipients; ensure assistance agreement recipients respond to all technical comments received.
Reviews recommendations from the Chesapeake Bay Program's Information Management Subcommittee; determines necessary response actions; assigns responsibility for followup to response actions.	Works with the Chesapeake Bay Program's Information Management Subcommittee in the development and implementation of a process for ensuring quality assured data and associated documentation are served to the partners and public through the Chesapeake Information Management System.	Formally transmit any technical issues and/or requests for response to issues raised by the Chesapeake Bay Program's Information Management Subcommittee to assistance agreement recipients; ensure assistance agreement recipients respond to all technical comments received.
Reviews recommendations from the Chesapeake Bay Program's Subcommittees; determines necessary response actions; assigns responsibility for followup to response actions.	Works with the Chesapeake Bay Program Subcommittees to identify quality assurance related issues raised during the analysis and interpretation of environmental data collected as part of the Chesapeake Bay Basinwide Monitoring Program.	Formally transmit any technical issues and/or requests for response to issues raised by the Chesapeake Bay Program's Subcommittees to assistance agreement recipients; ensure assistance agreement recipients respond to all technical comments received.

1.3.2 Communications

There are many forms of communication for ensuring quality assurance is integral to environmental collection efforts. Managers (Director and Associate Directors) of the Program review the Quality Management Plan annually and concur by signing the document. Project Officers receive routine grants management training which includes the most recent requirements of the quality assurance system. These requirements are communicated to grantees and assistance agreement holders via the grant guidance, which is described in Section 7 below.

Once a submitted Quality Assurance Project Plan is approved, progress reports are generally submitted quarterly or semi-annually, updating the quality assurance status. Further quality assurance and quality control documentation is

required with the submission of data both in the form of quality control data and metadata for the data themselves. Progress reports should include the following as necessary:

- Changes to quality assurance program plan;
- Status of completion of quality assurance project plan;
- Measures of data quality from the project;
- Significant quality problems, accomplishments, and status of corrective actions;
- Results of quality assurance performance audits;
- Results of quality assurance system audits;
- Assessment of data quality in terms of precision, accuracy, completeness, representativeness, and comparability; and
- Quality-related training.

The Project Officer shall notify the Chesapeake Bay Program Office Quality Assurance Officer immediately of any problem areas identified. Necessary changes will be jointly outlined and the Project Officer will institute the corrective actions. A follow-up review of the required changes will be made by the Chesapeake Bay Program Office Quality Assurance Officer and the Project Officer to verify that problems have been corrected.

1.4 RESOURCES FOR THE QUALITY ASSURANCE PROGRAM

Responsibilities for implementation of the Chesapeake Bay Program Office Quality Assurance Program are distributed across a wide array of project officers, Subcommittee Coordinators, the Data Center Manager and others beyond the Quality Assurance Officer. Without a dedicated EPA FTE, the Associate Director for Science performs the duties of the Chesapeake Bay Program Office Quality Assurance Officer. The Chesapeake Bay Program funds a full time Quality Assurance Coordinator through the U.S. Geological Survey.

2 QUALITY SYSTEM AND DESCRIPTION

The goal of the Chesapeake Bay Program Office's Quality Assurance Program is to ensure that each funded project involving the collection of new environmental data includes sufficient up-front planning for the development of well defined project goals and data quality objectives. These objectives need to be supported by implementation of sampling design, collection, and analysis protocols such that the resultant data completely and accurately addresses the project's goals. In order for the data to be useful to efforts to restore and protect the Chesapeake Bay, the data must be of known and documented quality, having sufficient supporting documentation such that subsequent data users can evaluate if the data meets their data needs.

2.1 DESCRIPTION

It is the policy of the Chesapeake Bay Program Office that:

- This Quality Management Plan be implemented as described herein and reviewed annually to ensure that it continues to accurately describe the organization and quality management policies of the Chesapeake Bay Program Office.
- Each major project or program funded by the Chesapeake Bay Program Office which generates environmental data will develop and implement a Quality Assurance Project Plan addressing the required major elements and will ensure that adequate resources (both monetary and staff) are provided to support the quality assurance effort. The Quality Assurance Project Plan will specify the detailed procedures required to assure quality data. Quality Assurance Project Plans must be jointly approved by the Chesapeake Bay Program Quality Assurance Officer and the Project Officer prior to data collection. Special exemptions can only be requested and approved through the Chesapeake Bay Program Office Quality Assurance Officer.
- All environmental data generated for the Chesapeake Bay Program through direct Chesapeake Bay Program Office funding or matching funding will be of known and acceptable quality as defined in the Data Quality Objectives. The data quality information developed for all environmental data will be documented and made electronically available along with the data themselves.
- All Chesapeake Bay Program Office funded environmental data collection and analysis efforts will include acceptable quality assurance requirements.
- The intended use(s) of the data will be defined before the data collection or analysis effort begins, so that appropriate quality assurance measures may be applied to ensure a level of data quality commensurate with the monitoring objectives. The determination of this level of data quality shall also consider the prospective data needs of secondary users. Data quality objectives will be established to ensure the utility of the environmental data for its intended use and as guidance for preparation of Quality Assurance Project Plans. The intended data uses, level of quality, specific quality assurance activities, and data acceptance criteria needed to meet the data quality needs of these uses will be described in each environmental data collection activity's Quality Assurance Project Plan.
- Quality assurance activities will be designed in the most cost effective fashion possible without compromising data quality objectives.

As the Chesapeake Bay Program partners attempt to minimize the redundancy of monitoring efforts in the Bay while maximizing the amount of quality data in its data base, the Chesapeake Bay Program partners need to use data generated through other Regional grants. Under the auspices of the Regional Quality Management Plan, the Chesapeake Bay Program Office will work through the appropriate Program Offices of Region III to inform them of the quality assurance requirements of the Chesapeake Bay Program for inclusion in their Grant Requirements as is appropriate.

2.2 PRINCIPAL COMPONENTS OF THE QUALITY SYSTEM

There are several base and enhanced components to the Chesapeake Bay Program Quality Assurance Program to carry out these policies. The base program consists of the development and maintenance of Quality Management Plans, Data Quality Objectives, Quality Assurance Project Plans, and the Chesapeake Information Management System. Management and staff roles and responsibilities related to these components are described above on pages 4-6. EPA Quality System documents can be found at http://www.epa.gov/quality1/qa_docs.html.

There are a number of additional components to the overall quality assurance programs. The Analytical Methods and Quality Assurance Workgroup (AMQAW) advises the Chesapeake Bay Program Monitoring and Analysis Subcommittee on field and analytical methodology and quality assurance issues. AMQAW is responsible for the Chesapeake Bay Program's Coordinated Split Sample Program (CSSP), which ensures that data from the different laboratories are comparable, and for the maintenance of a program-wide Methods Manual. The Data Analysis Investigation Tracking System (DAITS) is used to identify, research and resolve questions about data quality. The Chesapeake Bay Program's Information Management Subcommittee is charged with developing data/information management and submission policies and guidelines.

2.2.1 Data Quality Objectives

Data quality objectives are statements of the quality of environmental data required to support Program decisions or actions. Prior to initiating long-term monitoring programs, the Chesapeake Bay Program establishes data quality objectives through a formally structured process where it is determined which environmental data are needed, what data quality is required and what is the appropriate balance between time, resources and data quality.

2.2.2 Quality Assurance Project Plans

All directly Chesapeake Bay Program funded and in-kind match projects which involve the collection of new environmental data (activities that involve the measurement, monitoring, or collection of physical, chemical, or biological data) are required to document all aspects of their project's sampling design, sample collection, analysis, quality control, and data management activities in a quality assurance project plan. Within the Chesapeake Bay Program, these projects include the collection of groundwater, surface water quality, sediment, atmospheric, living resource, and remotely sensed data as well as the collection of environmental data to assess the efficiency of implemented management practices or control technology upgrades.

A quality assurance project plan is a formal document describing the methods for collecting and assessing environmental data, quality assurance, quality control, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. A quality assurance project plan is submitted to the Project Officer along with the draft grant or assistance application or listed as a deliverable to be received at least 30 days prior to the initiation of each data collection or data compilation activity. Each of the extramural organizations' Quality Assurance Project Plan must be reviewed and approved by EPA prior to the initiation of each data collection or data compilation activity. The requirements for quality assurance project plans are defined in *EPA Requirements for Quality Assurance Project Plans* (QA/R-5) (EPA 1999), which is available on the worldwide web at http://www.epa.gov/quality1/qa_docs.html.

For ongoing environmental data collection programs, the quality assurance project plans must be updated annually to include any changes to field, sample handling and storage, laboratory analysis, quality control, and data management activities are accurately documented. The funding recipient should notify the Project Officer prior to changing the number of samples, the number of sites, or the number of parameters. If no changes are required to an existing quality assurance project plan, the funding recipient is required to provide written documentation (e.g., a letter) to the Project Officer that a review was conducted and no changes have occurred.

All efforts must be made to produce data that is comparable to data collected previously and currently by other Chesapeake Bay Program grant recipients and partners. The funding recipient shall ensure the agencies, academic institutions, and/or consulting firms responsible for field sample collection and/or laboratory

analysis of environmental samples collected using Chesapeake Bay Program funds or match funds will participate in the Chesapeake Bay Program Coordinated Split Sample Program.

2.2.3 Quality Management Plans

In accordance with 40 CFR 30.54 and 31.45, organizations conducting environmental programs funded by EPA that acquire, generate, compile, or use environmental data and technology are required to establish and implement a quality system. Recipients of ongoing contracts, grants or cooperative agreements shall describe their quality system in a written Quality Management Plan. Quality Management Plans must be prepared in accordance with *EPA QA/R-2: EPA Requirements for Quality Management Plans* and be submitted for review and approval to the U.S. EPA Region 3 Quality Assurance Manager. EPA QA/R-2 is available on the worldwide web at http://www.epa.gov/quality1/qa_docs.html. Prior to the initiation of environmental data collection and/or compilation activities, each of the extramural organizations' Quality Management Plan must be reviewed and approved by EPA. The CBPO Quality Assurance Officer may approve combined Quality Management and Quality Assurance Project Plans.

Note: Quality Management Plans are not required from federal agencies outside of EPA, however, it is the policy of the Chesapeake Bay Program Office that all federal interagency agreements fulfill QA Project Plan requirements.

2.2.4 Standard Operating Procedures

It is common that Quality Assurance Project Plans submitted under grants and cooperative agreements include Standard Operating Procedures (SOPs) to describe detailed sample collection and laboratory procedures. The SOPs are submitted, reviewed and approved at the same time as the corresponding Quality Assurance Project Plan.

The CBPO maintains internal SOPs for the management of monitoring data submitted to the Chesapeake Information Management System. CBPO routinely receives data that are checked, compiled and uploaded into several interstate databases. The Data Management SOPs are written by personnel performing the routine data management tasks so that the actual practices are recorded. Chesapeake Bay Program Office SOPs are prepared in document control format and are submitted to the Chesapeake Bay Program Office Quality Assurance Officer for maintenance in a permanent file. If applicable, the SOP is also kept

in the grant file under which the data manager is funded.

Chesapeake Bay Program Data Management SOPs

- (1) *Standard Operating Procedures for Managing Water Quality Monitoring Data*, Chesapeake Bay Program, August 27, 2003.
- (2) *Standard Operating Procedures for Managing Non-Point Source Data*, Chesapeake Bay Program, June 14, 2002.
- (3) *Standard Operating Procedures for Managing Point Source Data*, Chesapeake Bay Program, July 30, 2002.
- (4) *Standard Operating Procedures for Conducting Geographic Information System (GIS) Projects*, Chesapeake Bay Program, August 28, 2001.
- (5) *Standard Operating Procedures for Managing Living Resource Monitoring Data*, Chesapeake Bay Program, September 30, 2004 (draft).

2.2.5 Chesapeake Information Management System

The Chesapeake Information Management System (CIMS) is an organized, distributed system of information and software tools designed for the purposes of management, decision making, and communicating Chesapeake Bay information. Internet sites in CIMS are maintained by CIMS Partners, who are those states, federal agencies, academic institutions, and participating advisory groups and commissions who have signed a Memorandum of Agreement providing public access to its Chesapeake Bay watershed information.

With continued implementation of the Chesapeake Information Management System, the data generators are responsible for building in mechanisms for auditing data quality prior to making their data accessible to users via the Internet. Standardized procedures for auditing data quality are developed and adapted to the Chesapeake Bay Program partners.

2.2.6 Audits and Assessments

Technical assessments of long-term monitoring activities are conducted to confirm that grantee Quality Assurance Project Plans are being implemented. Each quarter, laboratory proficiency sample results are reviewed and if necessary, corrective actions are initiated. Proficiency sample results are summarized and reported annually to each laboratory.

Independent assessments of quality control data are periodically performed to ensure that grantees are meeting data quality objectives. The Quality Assurance Coordinator conducts on-site technical audits when unsatisfactory proficiency or quality control sample results are received. Further details are described in Section 9 below. For new monitoring programs, readiness reviews are done to assess grantees' capability to carry out field, laboratory and/or data management activities.

Internal audits and self-assessments of grant files are routinely conducted by the Chesapeake Bay Program Grants Manager to ensure that quality assurance requirements have been met and documented in the grant files.

2.3 MONITORING PROGRAMS SUPPORTED BY THE QUALITY SYSTEM

There are numerous projects supported or impacted by the Chesapeake Bay Program Office Quality Assurance Program. Examples of major projects included are: the Chesapeake Bay Mainstem and Tidal Tributary, Fall Line, Ambient Toxicity, and the Atmospheric Deposition Monitoring Programs.

3 PERSONNEL QUALIFICATION AND TRAINING

EPA and other Chesapeake Bay Program participants have received training in the context of tasks and functions related to data quality for the Chesapeake Bay Program. In addition, they are required to draw upon their educational background, experience, professional symposia, and on-the-job training. Staff participate in technical workshops to share and expand their knowledge in their areas of expertise. Staff proficiency is demonstrated through workshop presentations, written reports, committee presentations and Chesapeake Bay Program Publications.

The Chesapeake Bay Program Quality Assurance Coordinator has completed the following EPA Quality Assurance Training Classes:

1. Orientation to Quality Assurance Management
2. Data Quality Objectives
3. Preparing Quality Assurance Project Plans
4. Reviewing Quality Assurance Project Plans
5. Sampling Design

Project Officers receive formal instruction from the Agency every three years to explain their legal assistance agreement oversight responsibilities. Project Officers who intend to approve Quality Assurance Project Plans must complete courses 1, 2, and 4 above within two years from the effective date of this Quality Management Plan.

Project Officers who approve Quality Assurance Project Plans must be authorized to do so by the Chesapeake Bay Program Office Quality Assurance Officer, who will document the completion of the required training.

4 PROCUREMENT OF ITEMS AND SERVICES

Most of the environmental collection services are obtained through the use of grants, cooperative agreements, or interagency agreements. Guidance for grant and cooperative agreement applications is developed as a collaborate effort among project officers in the Chesapeake Bay Program Office, with input from Bay Program partners of the Chesapeake Executive Council. The guidance specifies the quality assurance requirements of the Chesapeake Bay Program. The guidance is reviewed, updated and distributed annually to potential recipients of Bay Program funding as well as made available through the Chesapeake Bay Program website. Requirements for quality assurance and data deliverables are communicated to grant and agreement recipients through the Requests for Proposals and the *EPA Chesapeake Bay Program Grant and Cooperative Agreement Guidance*.

The Chesapeake Bay Program may use data which are generated under the auspices of other EPA federal, and state funding mechanisms. For data beyond the direct control or influence of the decision makers and users within the Chesapeake Bay Program Office, the Bay Program Office is actively working within Region III and with other funding partners to develop consistent guidance materials and Quality Assurance Project Plans.

4.1 REVIEW AND APPROVAL OF RESPONSES TO SOLICITATION

The Chesapeake Bay Program Office has an extensive system in place to review and approve solicitations to grants, contracts and cooperative agreements. The process is initiated through extensive advertisement of a request for proposals (RFPs)/qualifications through the Federal Register, the Chesapeake Bay Program website, and a RFP database designed in the spring of 1999. Once proposals are received, they are initially screened by the Chesapeake Bay Program Office administrative team for deadline requirements, necessary applicant designations (e.g. nonprofit status), and other requirements specified by the RFP. After initial screening, the proposals are sent to a panel of three to five reviewers who rate each proposal on a predetermined set of criteria which is addressed within the RFP. The ratings for each proposal are sent to the Office Director for a final selection of the grant, contract, or cooperative agreement recipient.

4.2 REVIEW AND APPROVAL OF EXTRAMURAL PROJECTS

Following the selection of the recipient and proposal to be funded, the applicant is required to submit a formal grant application. The application then goes through extensive administrative and technical reviews. Once the final award document is signed, work can begin on the project. Post award oversight by the Chesapeake Bay Program Office is mandated through the Chesapeake Bay Program Office (CBPO) Post Award Monitoring Plan for Grants and Cooperative Agreements for 2001. This document describes in great detail the duties of the Project Officer such as:

- Comprehensive tracking of administrative and technical elements of assistance agreements;
- Communication between recipients and the Grants and Audit Management Branch;
- Documentation of files;
- Monitoring of a recipient's compliance with the Statement of Work, Assistance Agreement Terms and Conditions and Budget Expenditures; functions of CBPO Grants Special Task Team;
- Attendance of quarterly meetings Project Officer meetings and training;
- Duties of the Designated Liaison with Grants and Audit Management Branch; and
- On-site, mid-year, and closeout review requirements and the certification of the receipt of final deliverables.

The CBPO Grants Manager provides training and periodically audits Project Officer files to ensure that they contain the required information.

4.3 REVIEW AND APPROVAL OF QUALITY ASSURANCE PROJECT PLANS

All environmental data collection and analysis efforts funded by the Chesapeake Bay Program Office shall have an associated Quality Assurance Project Plan approved by the Chesapeake Bay Program Office Quality Assurance Officer and the Project Officer. Specifically, the Quality Assurance Project Plan shall ensure that:

- The level of data quality needed will be determined and stated before the data collection effort begins; and
- All environmental data generated and processed will reflect the quality and integrity established by the Quality Assurance Project Plan.

The Quality Assurance Project Plan documents the data quality objectives or "acceptance criteria" for a project, identifies the critical measurements to be performed, and discusses the quality assurance activities to be conducted during the sampling, analytical and validation phases of the project. All Quality Assurance Project Plans shall

adhere to QA/R-5, *EPA Requirements for Quality Assurance Project Plans* (EPA 1999). Where possible, document control format as exhibited in this document shall be utilized.

For all new environmental data collection activities a draft quality assurance project plan for EPA review and approval are required at least 30 days prior to the initiation of each data collection or data compilation activity. The originating Project Officer shall notify the Chesapeake Bay Program Office Quality Assurance Officer and Subcommittee Coordinator regarding the processing of the grant, interagency or formalized agreements during the planning phase. The Project Officer has responsibility for his/her project and is the official contact with the funding recipient. However, the Project Officer must obtain concurrence from the Chesapeake Bay Program Office Quality Assurance Officer on all matters affecting quality assurance.

Quality Assurance Project Plans shall be reviewed and approved in the context of the Project Data Quality Objectives prior to environmental data collection or compilation. The Chesapeake Bay Program Office Quality Assurance Officer and Project Officer shall review and evaluate the use of these Plans during the environmental monitoring and assess the quality of the data generated and processed for Chesapeake Bay Program. Upon completion of the environmental data collection activities, the Project Officer shall also assess the actual performance of the planned activity and subsequent results according to the criteria described in the Quality Assurance Project Plans. Distribution lists of personnel who need to receive quality assurance reports and information are to be maintained as part of the Document Control System.

The Chesapeake Bay Program Office Quality Assurance Officer shall notify the Project Officer and the appropriate Chesapeake Bay Program Subcommittee Coordinator immediately of any problem areas identified in the review of the Quality Assurance Project Plan. Necessary changes will be jointly determined and the Project Officer will outline the corrective actions. A follow-up review of the required changes will be made by the Chesapeake Bay Program Office Quality Assurance Officer, Subcommittee Coordinator, and Project Officer to verify that problems have been corrected. Subcommittee Coordinator and Project Officer shall review, comment on, and concur with the draft project report prior to the release of the final report.

If no changes are required to an existing quality assurance project plan, the grant recipient is required to provide written documentation (e.g., a letter) to the Project Officer stating that a review was conducted and no changes have occurred. The Chesapeake Bay Program Office Quality Assurance Officer and Project Officer must find the current Quality Assurance Project Plans for these activities acceptable prior to the approval of the grant, interagency or formalized agreement.

The Chesapeake Bay Program Office Quality Assurance Officer maintains a current

file of all approved Quality Assurance Program Plans, Project Plans, and Standard Operating Plans for all environmental data collections programs funded by the Chesapeake Bay Program Office and makes all these documents directly accessible to data users through the Chesapeake Bay Program's web site.

4.4 AUDIT OF DATA QUALITY

All routine water quality monitoring data generated through the Chesapeake Bay Program are submitted on a regular basis. The State of Maryland and the Commonwealth of Virginia and their respective contractors are subjected to an Audit of Data Quality (ADQ). Before the Project Officer signs off on any particular data set submitted, monitoring data are run through a series of automated computer verification programs, called the Quality Assurance Tool (QAT). The QAT permits data submitters to upload both regular data submission and special submissions to replace data already in the CIMS Water Quality Database. After the data set is uploaded it is placed in a processing queue. During processing a text report is created listing each of the over 150 quality assurance checks and the records that fail each check. These reports are reviewed and approved by the CBPO database manager before a data set is imported to the water quality database.

5 DOCUMENTATION AND RECORDS

Every data set served by Chesapeake Bay Program Office funded data generators is accompanied by a related file documenting the source of the data, the contact for additional information, the sponsoring and collecting organizations, the reasons for collecting the data, published documents or reports associated with the data, and other items. Documentation on data base files is essential for drawing meaningful interpretations of the data contained in the data base. In addition, data base management is dependent upon structured, easy-to-use documentation. The Chesapeake Bay Program Data Center Manager ensures that these tasks are performed (See section 1.3.1). The Chesapeake Bay Program Office has no chain-of-custody requirements for sample collection so chain-of-custody documentation is unnecessary.

Technical guidance and other quality related documents are prepared by the Subcommittee members, peer reviewed and approved by the Subcommittee and/or Implementation Committee. Once approved, guidance documents are given an EPA Document Control Number and filed electronically for future printings and revisions. Documents and publications are available on the Bay Program website (<http://www.chesapeakebay.net>) and at the Chesapeake Bay Program Office.

The Chesapeake Bay Program Office Administration Team is responsible for document control. All publications and reports have a unique document number and date. A listing of publications is maintained and hard copies kept on hand in a publication "library". For

guidance documents, only the most recent versions are available for distribution.

Quality Assurance Project Plans, data reports and interpretive reports submitted for grants and assistance agreements are placed in the corresponding grant files and kept seven years after the date of last correspondence. Inactive files are placed in labeled cardboard boxes and stored in a locked room with limited access. Document control for publications available from the Bay Program website is achieved by requiring data sets, reports and publications to have an associated metadata record in COMET, the CIMS online metadata entry tool (<http://www.chesapeakebay.net/comet/>) prior to website release.

For database documentation, database managers are responsible for documenting and discontinuing the use of obsolete and superseded procedures. Data management standard operating procedures (SOPs) are reviewed annually to ensure that procedural changes have been incorporated.

6 COMPUTER HARDWARE AND SOFTWARE

Chesapeake Bay Program Office funded data served through the Chesapeake Information Management System are managed through a variety of hardware or software and use standardized data management guidelines and policies to ensure consistency and comparability.

6.1 HARDWARE AND SOFTWARE DEVELOPMENT PROTOCOL

The Data Center development process is a user-driven, peer-reviewed process aimed at efficiently solving business problems. Solutions should involve team-based knowledge transfer, conform to Data Center and industry best practices, and utilize standards-based architecture and reusable logic. The process is not strictly iterative but rather is designed to be a guideline or best practice for application development that demands ongoing communication throughout the project life cycle.

The typical project lifecycle has nine phases: assessment, planning, design, prototyping, development, testing, documentation, deployment and maintenance. *Attachment 3. Data Center Project Planning Guide*, describes each of the development phases.

6.2 DATA AND INFORMATION STANDARDS

The Chesapeake Bay Program has adopted data and information standards to improve coordination, compatibility, standardization, and access to data. Grantees, contractors, and data servers are required to submit deliverables in electronic format. Electronic deliverables include reports, graphics, spreadsheets, imagery, data files, audio, and digital

video products. All data and information, whether funded directly or indirectly by the CBPO, is considered public information and may be made available to the public. Standards for submitting data and information are documented in *Chesapeake Bay Program Guidance for Data Management* (January 2001). The document describes the policies and guidelines for:

- ▶ Data, Information and Document Delivery
- ▶ Deliverable Serving vs. Submission
- ▶ Locational Data
- ▶ Map Coordinate Datum
- ▶ Map Coordinate Projection
- ▶ Metadata
- ▶ Common Station Names
- ▶ Common Data Dictionary
- ▶ Common Database Design
- ▶ Calendar Date
- ▶ Common Method Codes
- ▶ Data Reporting
- ▶ ITIS Biological Nomenclature

The full document is attached in an electronic file (Attachment 3) and available on the web at http://www.chesapeakebay.net/cims/data_management_guidance_03.pdf

Specific guidelines for descriptive information, i.e., metadata, are documented in *Chesapeake Information Systems Metadata Reporting Guidelines* (September 1998), which is attached in an electronic file (Attachment 4) and presently available on the web at <http://www.chesapeakebay.net/cims/metasep.pdf>.

Chesapeake Bay database managers process data deliverables and identify errors to the reporting requirements. Chesapeake Bay database managers contact the data generator directly to resolve minor errors, however, they consult with the appropriate Project Officer to resolve major reporting errors or omissions.

7 PLANNING

The planning process begins with program-wide data collection priorities which are documented in a comprehensive monitoring strategy. The Monitoring and Analysis Subcommittee prepares a 3-year monitoring plan and budget projections for all CBPO funded monitoring programs. (The FFY 2002 through 2004 plan is on the CBP website at <http://www.chesapeakebay.net/pubs/subcommittee/Monitoring-3yrPlan.pdf>.) Subcommittees select and rank project proposals based on the project's ability to meet one or more objectives set forth in the 3-year plan. The proposals are submitted to the Budget Steering Committee for

funding approval. To receive the funding, principal investigators formally apply for an EPA grant or cooperative agreement by submitting a detailed scope of work describing the details of the environmental data operations.

Technical specifications for monitoring and data analysis are established by CBPO workgroups, which consist of staff from CBPO, state and federal agencies, academic institutions and subcontractors. For long-term projects, workgroups agree upon common objectives, designs, parameters, methods and quality assurance practices to ensure consistency and comparability of data from multiple agencies and investigators. Data are checked and analyzed within 3-6 months after reporting so the effectiveness of the data operations is continually monitored.

Data from outside sources (i.e., secondary data) may be utilized following peer review and evaluation through the respective Chesapeake Bay Program workgroup. Hydrological, meteorological and agricultural data from USGS, NOAA and USDA are acceptable. Point-source and non-point source data that are generated by state and county agencies are compiled by CBPO data managers into CBPO databases. These data are subjected to a closer review for accuracy and completeness prior to being utilized. Acceptance criteria for these secondary data sets are documented in the SOPs for point-source and non-point source data management.

Processes for the development and approval of Quality Management Plans and Quality Assurance Project Plans are described in Sections 2.2 and 4.3 above. Requirements for these plans are communicated to grantees and assistance agreement holders via the grant guidance.

8 IMPLEMENTATION OF WORK PROCESSES

Work processes are monitored through a collaborative effort between the appropriate Chesapeake Bay Program subcommittee and the Project Officer. Projects are evaluated and prioritized through each subcommittees and finally funded through recommendations from the Budget Steering Committee to EPA. Activities and outputs of the projects are presented to the respective subcommittee, who actually use the information. Each of the projects are overseen by a Project Officer. They are responsible for initiating the project, reviewing the progress reports, receiving applicable data and receiving reports. Project Officers work in conjunction with the subcommittee to ensure that the project proceeds in the correct direction and generates the appropriate documents, in-line with the desires of the subcommittee. If a Project Officer, subcommittee or grantee decides to make changes to a project, the Project Officer documents the changes to the grant file and amends the grant if necessary.

9 ASSESSMENT AND RESPONSE

9.1 TECHNICAL SYSTEMS AUDIT

Technical systems audits, which focus on the actual quality control in environmental measurement data collection systems, are performed annually at each laboratory and field data collection center involved the generation of data funded by the Chesapeake Bay Program Office. The technical systems audits are performed by the Chesapeake Bay Program Quality Assurance Coordinator who is experienced in water quality chemistry, data collection technology, and quality control procedures. The audit addresses an examination of calibration records, sampling and measurement procedures, general laboratory conditions, support systems, equipment and facilities, maintenance and repair records, control charts, etc. Technical systems audits reports are submitted by the Chesapeake Bay Program Quality Assurance Coordinator to the Director of the audited laboratory and/or field operation with copies to the appropriate State Project Manager as well as to the Chesapeake Bay Program Subcommittee Coordinator and the Project Officer.

Reports of corrective action are to be submitted by each facility to the Chesapeake Bay Program Quality Assurance Coordinator within 45 days of receipt of the Technical Systems audit report. Items not corrected will be brought to the attention of the funding recipient, Program Manager, the Project Officer, the Chesapeake Bay Program Subcommittee Coordinator, and the Chesapeake Bay Program Office Quality Assurance Officer. The Project Officer has the authority to suspend or stop work in progress upon detection and identification of a situation affecting the quality of the results.

9.2 PERFORMANCE EVALUATIONS

On an annual basis, blind audit samples are distributed to the laboratories participating in the Mainstem Monitoring Program for Water Quality. An effort is made to adjust blind audit sample instructions to allow the analysis of concentration ranges appropriate to the Program's ambient monitoring levels. Ampules are prepared with deionized water as a diluent. It is recognized that this is not ideal in the context of an ambient matrix which is predominantly saline. However, to date there is no available source of certified audit materials in a saline matrix. The possibility of contracting for the development of an audit material customized to the subject matrices will be investigated.

Results are returned by the laboratories to the Chesapeake Bay Program Quality Assurance Officer for comparison with the current statistical estimates of the 95 and

99% confidence intervals. Audit sample performance is used along with independent technical systems audits to evaluate each laboratory's capability in analysis of the parameters of interest.

9.3 PEER REVIEW

The performance and comparability of water quality methods is an ongoing activity of the Analytical Methods and Quality Assurance Workgroup. This workgroup provides a technical peer review of data collection and reporting activities to ensure consistency. This group evaluates blind audit and coordinated split sample results and identifies procedural differences and recommends corrective actions to ensure inter-laboratory agreement. If corrective actions affects the interpretation of the data, the group determines the magnitude of the affect is measured. All significant findings are reported to the appropriate Subcommittee and documented in the minutes of the meetings and in the Data and Information Tracking System.

9.4 MANAGEMENT ASSESSMENTS

As part of the annual Quality Management Plan review process, senior management will review and assess the adequacy of the quality system to meet the needs of the Program. The Chesapeake Bay Program management undergo a routine, independent Management Systems Reviews assessment where management controls, training, resources, personnel and accomplishments are reviewed. Region III staff report the findings and make recommendations for improvement.

10 QUALITY IMPROVEMENT

All staff are responsible for quality improvement within their areas. Senior managers communicate critical activities of the Program at program-wide staff meetings and solicit input for improvements. The Associate Director for Science is responsible for the overall quality improvement program, the function of which is to identify the cause and consequence of a problem and suggest actions to prevent its recurrence.

Managers of the Chesapeake Bay Program Office also use the Subcommittee structure to continually identify, plan, implement and evaluate the quality and effectiveness of the Chesapeake Bay Program's work.

Attachment 1
Chesapeake Bay Program Guidance for Data Management



Acrobat Document

Attachment 2
Chesapeake Information Management System Metadata Reporting Guidelines



Acrobat Document

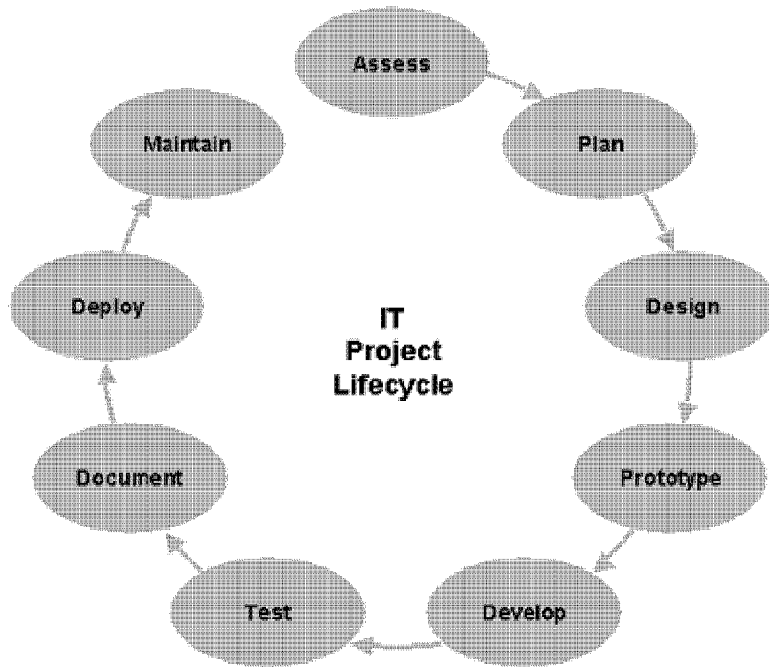
Attachment 4. Data Center Project Planning Guide

Background:

The Data Center development process is a user-driven, peer-reviewed process aimed at efficiently solving business problems. Solutions should involve team-based knowledge transfer, conform to Data Center and industry best practices, and utilize standards-based architecture and reusable logic. The process is not strictly iterative but rather is designed to be a guideline or best practice for application development that demands ongoing communication throughout the project life cycle.

Project Lifecycle:

The typical project lifecycle has nine phases: assessment, planning, design, prototyping, development, testing, documentation, deployment and maintenance.

**Project Planning:**

Attachment 3-A, *Project Planning Flowchart*, contains a detailed view of work flow and approval process for the Data Center. Attachment 3-B, *Project Planning Checklist*, contains a checklist to serve as a guide for Data Center projects.

Assess:

The project assessment phase involves analyzing client requirements in order to construct a technology-and-solution-free problem statement. A well-defined problem facilitates the development of the best solution. The outcome of the assessment phase is a requirements document containing a problem statement, user assessment and detailed solution deliverable dates. Attachment 3-C, *Requirements Template*, contains the suggested format for the requirements analysis document. Attachment 3-D, *Client Questionnaire*, contains a series of client questions to assist in the formulation of the requirements. The requirements document are to be reviewed by the Data Center Manager, Communications Team and other key staff to ensure the project fits within the Data Center and Communication goals.

Plan:

The project planning phase builds on the assessment phase to include an overview of what the solution is likely to involve, metrics that will demonstrate the problem has been solved, software and hardware needs, a rough schedule, and key personnel for the project. The outcome of the planning phase is a solution overview document and meeting to detail the schedule, metrics, key personnel, and key users of the proposed system. The meeting should include representation from both the technical solution developers and the users of the system. Attachment 3-E, *Solution Overview Template*, contains the suggested format for the solution overview.

Design:

The design phase often contains 3 parts: a paper prototype of the interface, a design document for the data, and a design document for the application logic. The paper prototype is paper representation of the user interface. The objective is to evaluate the effectiveness of the proposed design by working through a usability evaluation with members of the user community. The Web Team is responsible for ensuring the paper prototype and usability evaluations follow the Data Center best practices.

The design document for the data should contain an entity-relationship diagram to identify existing and planned data elements and structures, as well as relationships between entities and elements. The Data Team is responsible for reviewing the data design.

The design document for logic should include use case diagrams and detail existing and planned reusable logic classes using a static structure diagram. The Application Team is responsible for the review of the logic design document.

Prototype:

The prototype phase is for creating an electronic version of the paper prototype. It goes beyond the design phase in that code is written to demonstrate the most likely look and feel of an application. The necessity of this step is guided by the users interest in seeing an application shell prior to intensive development. Focus is on the presentation layer of the application, the 'usable-ness' of the application, and the identification of test criteria.

Develop:

Building on the previous phases, the development phase is the physical construction of the solution. This includes developing the required data elements, structures and relationships;

developing the user interface; and constructing the logic that drives the solution. The outcome of the development phase is a fully functional solution operating in a development environment.

Test:

In this phase Data Center developers and critical users are afforded the opportunity to test the application in the development environment. Errors in the application are systematically noted and corrected. Additionally, solution performance under a variety of load conditions is evaluated and corrected as necessary.

Document:

Ideally application and database documentation is written during development and best practices are employed so that code and data elements are as descriptive as possible. Documentation, whenever possible, is included with code and in databases. User documentation may also be a requirement which is finalized as well in this phase. The outcome of the documentation phase is a fully functional, user tested application that contains documentation for the data, logic and interface.

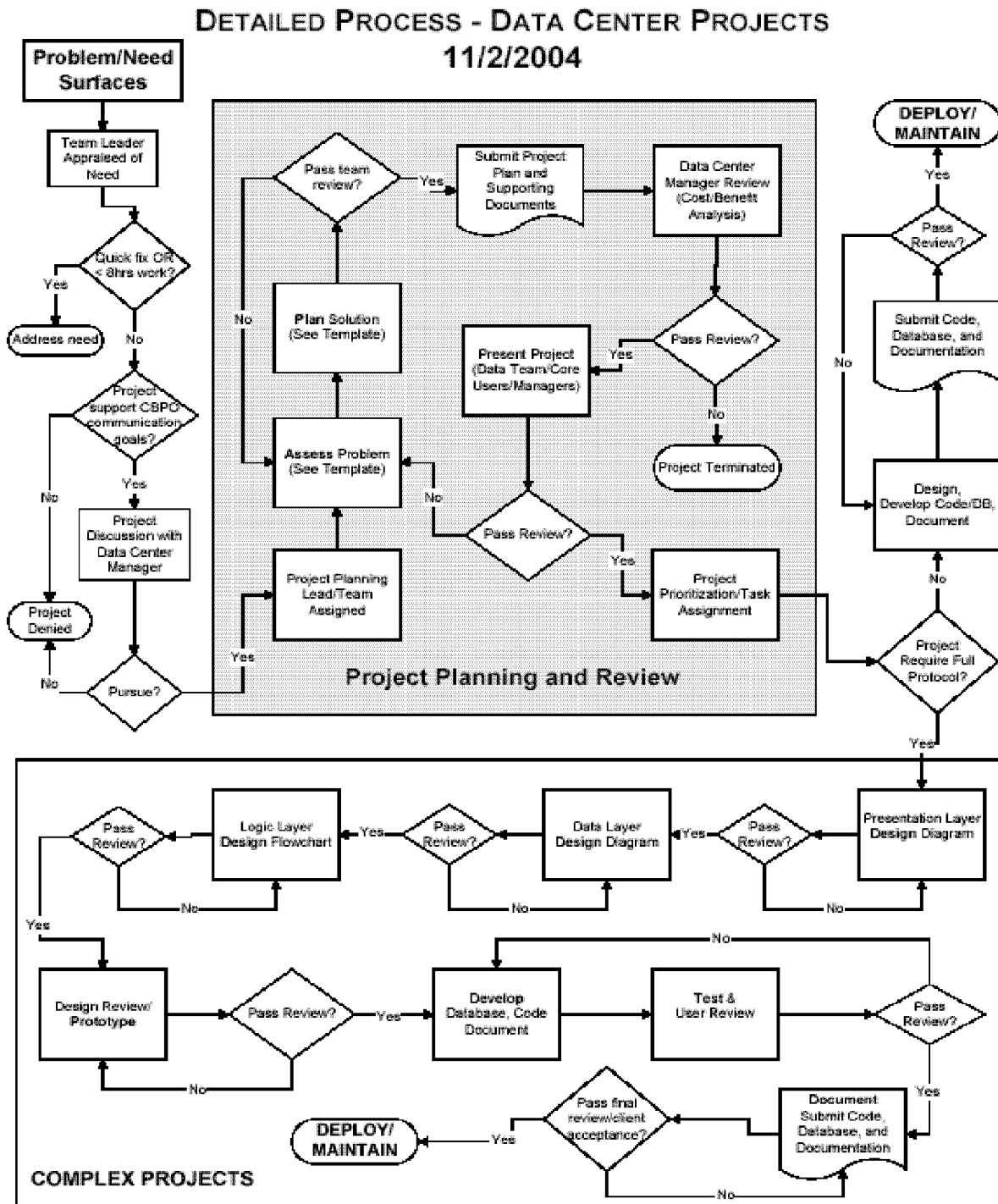
Deploy:

Prior to deployment, a meeting should be held that presents the application for a final review where the separate teams have an opportunity to discuss the application and the issues brought up during developing, testing, reviewing, and documenting the application. Following this pre-deployment meeting, the application is deployed from the development environment to the production environment in accordance with the deployment plan created in the Develop phase.

Maintain:

A maintenance plan is created that consists of scheduled maintenance, versioning plan, responsibility matrix. The project lead should also make note of lessons learned in the project.

Attachment 3-A: Project Planning Flowchart



Attachment 3- B: Project Planning Checklist

CBPO Data Center		8/26/2004
Project Planning Checklist		
Project Name: _____		
<input checked="" type="checkbox"/>	n/a	Task
1. Assess		
<input type="checkbox"/>	<input type="checkbox"/>	a. Provide necessary background information
<input type="checkbox"/>	<input type="checkbox"/>	b. Conduct <i>Client Interview</i> (see Client Questionnaire)
<input type="checkbox"/>	<input type="checkbox"/>	c. Develop solution-free problem statement
<input type="checkbox"/>	<input type="checkbox"/>	c. Create <i>Requirements Analysis</i> document (See Template)
<input type="checkbox"/>	<input type="checkbox"/>	d. Data Center Manager approval to continue work
2. Plan		
<input type="checkbox"/>	<input type="checkbox"/>	a. Identify architectural dependencies/requirements
<input type="checkbox"/>	<input type="checkbox"/>	b. Identify/justify roles, resources, technologies
<input type="checkbox"/>	<input type="checkbox"/>	c. Develop success metrics
<input type="checkbox"/>	<input type="checkbox"/>	d. Create <i>Solution Overview</i> document (see Template)
<input type="checkbox"/>	<input type="checkbox"/>	e. Present solution to appropriate users, developers, managers
<input type="checkbox"/>	<input type="checkbox"/>	f. Data Center approval
3. Design		
<input type="checkbox"/>	<input type="checkbox"/>	a. Develop data layer design diagram
<input type="checkbox"/>	<input type="checkbox"/>	b. Data Team approval of data layer design
<input type="checkbox"/>	<input type="checkbox"/>	c. Logic layer design diagram
<input type="checkbox"/>	<input type="checkbox"/>	d. Application Team approval of logic layer design
<input type="checkbox"/>	<input type="checkbox"/>	e. Develop presentation layer design diagram
<input type="checkbox"/>	<input type="checkbox"/>	f. Web Team approval
4. Prototype		
<input type="checkbox"/>	<input type="checkbox"/>	a. Develop prototype
<input type="checkbox"/>	<input type="checkbox"/>	b. Develop test criteria/ performance metrics
<input type="checkbox"/>	<input type="checkbox"/>	c. Review with client and audience representative(s)
5. Develop		
<input type="checkbox"/>	<input type="checkbox"/>	a. Data/database development
<input type="checkbox"/>	<input type="checkbox"/>	b. Logic development
<input type="checkbox"/>	<input type="checkbox"/>	c. Presentation development
<input type="checkbox"/>	<input type="checkbox"/>	d. Document
6. Test		
<input type="checkbox"/>	<input type="checkbox"/>	a. Performance metrics met/exceeded
<input type="checkbox"/>	<input type="checkbox"/>	b. Client and audience needs met/exceeded
7. Document		
<input type="checkbox"/>	<input type="checkbox"/>	a. Data Team approval of data layer documentation
<input type="checkbox"/>	<input type="checkbox"/>	b. Application Team approval of logic layer documentation
<input type="checkbox"/>	<input type="checkbox"/>	c. Web Team approval of presentation documentation
<input type="checkbox"/>	<input type="checkbox"/>	d. Data Center final approval
8. Deploy		
<input type="checkbox"/>	<input type="checkbox"/>	a. Resource location: _____
<input type="checkbox"/>	<input type="checkbox"/>	b. Documentation location: _____
9. Maintain		
<input type="checkbox"/>	<input type="checkbox"/>	a. Develop maintenance plan/agreement with client/audience representatives
<input type="checkbox"/>	<input type="checkbox"/>	b. Success metrics met/exceeded
<input type="checkbox"/>	<input type="checkbox"/>	c. Final client approval

Attachment 3- C: Requirements Template

REQUIREMENTS ANALYSIS

1. Background Information:

Provide brief overview of the relevant history. The client questionnaire should be used to assist in the development of the requirements analysis.

2. Problem to be Solved:

Without using technology or inferring a solution: what is the problem?

How is the client addressing the problem now?

Is there currently a system in place? What are the features? Problems?

Why is a solution important at this time?

3. User Assessment:

Who is the problem affecting?

Who will be the primary beneficiary of a solution?

What do the users need to accomplish?

How many users are there currently? Potentially?

4. Important Dates:

By when must the solution be provided?

Attachment 3-D: Client Questionnaire

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Questions for discerning project problem and user requirements.

Problem Statement:

1. Why do you want to have a _____ developed? (website, database, etc) *
2. What are your specific goals/targets for this project?
3. How are these goals currently being accomplished?
4. What are the shortcomings of the current method?
5. Does this product help you accomplish any C2K goals (if so which)?
6. Are you aware of any products or projects similar to what you've requested?
7. Would you agree that the problem is _____? (state the problem in your own words based on answers to the preceding questions)

** Ask this question only if user has a preconceived product in mind.*

Audience:

1. Specifically who will use this _____? (website, database, tool, etc)
2. How many users do you currently have?
3. Have potential users been interviewed to discuss their needs?
4. What incentive is there for users to use the product?
5. Will most of your users be new users or returning users?
6. Will the system need to know who the user is or remember the user?
7. Will this project involve any sensitive information?
8. Does it need to be secure?

Personnel:

1. Have you worked with anyone in the Data Center on this project already?

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2. **Who is the lead contact in your staff that has the final say in the decision making process?**
3. **What staff will provide the content and or data?**
4. **Who will maintain the product (content, data, etc)?**
5. **Who will market the product and how?**

Timeframe:

1. **What is the targeted date for a solution to be implemented?**
2. **Why was this target date chosen?**
3. **Does this project need to coincide with any other products or projects?**
4. **What is the expected lifespan of this product?**

Solution:

1. **Do your users rely on any specific technologies or network access?**
2. **Describe, in general terms, what the solution currently looks like in your imagination?**
3. **What would be the most important aspect of the solution?**
4. **How will the success of the solution be measured?**
5. **{State the solution overview and metrics back to the interviewee to verify that you understand what they have said}**

Attachment 3- E: Solution Overview

SOLUTION OVERVIEW

A. Overview

Broadly speaking, what might a solution look like?

Solution Metrics: What objective criteria will demonstrate that the problem is solved?

B. Architectural Dependencies/Requirements:

How does the project fit in with Data Center goals and target architecture?

Must the solution be provided with particular hardware or software?

Will hardware or software need to be purchased or upgraded?

Will new technologies be introduced into the Data Center as a result of this project?

- ✓ If so, what critical function does the new technology provide that existing Data Center technologies lack?
- ✓ What cost or performance benefits might be realized with this new technology?

C. Preliminary Schedule:

What are the necessary steps?

How much time might each step take?

What are the milestones in the project?

D. Key Personnel:

What are the necessary roles in the project?

Who will be responsible for each development tier?

Who are key management personnel? What is their specific role?